

REMARKS

Claims 24-39 and 54-73 are currently pending in the present application, including independent claim 24 and 32. Independent claim 24, for example, is directed to a method for reducing odor. The method comprises mixing the salt of a transition metal with silica particles to form a transition metal / silica particle mixture; selectively adjusting the pH of the mixture to 7 or greater so that modified silica particles are formed that contain the silica particles and the transition metal. The modified silica particles are contacted with an odorous compound. The transition metal provides one or more active sites for capturing the odorous compound.

In the Office Action, independent claim 24 was rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,486,356 to Yim in view of U.S. Patent No. 5,380,510 to Matsui, et al. Yim is directed to a deodorant that comprises a carrier selected from a group consisting of silica gel, MgO, and talc, a transition metal oxide or alloy, and a catalytic metal adsorbed on the carrier. The deodorant is made by immersing a carrier formed of a silica gel and transition metal oxide or alloy into an aqueous catalytic metal complex solution (e.g., $\text{Pt}(\text{NH}_3)_4\text{Cl}_2$). In this manner, 0.2 to 1 wt.% of the catalytic metal is "adsorbed" on the carrier. (Col. 2, ll. 34-54).

As correctly noted by the Examiner, however, Yim fails to disclose certain limitations of independent claim 24. For example, Yim fails to disclose selectively adjusting the pH of the claimed transition metal / silica particle mixture to 7 or greater so that modified silica particles are formed. Nevertheless, the Office Action cites Matsui, et al. in combination with Yim in an attempt to render obvious independent claim 24. Matsui, et al. is directed to a method for making silica gels in the form of scales or

needles. The method includes depositing a silica acid sol in gaps among faces of crystals of solvent of sol, which is crystallized by freezing the silica acid sol. This results in the formation of frozen silica hydrogels, which are then unfrozen, polymerized, and dried. (Col. 1, ll. 33-41). During this process, Matsui, et al. indicates that the pH of the silica acid sol may have a pH of 0 to 9. (Col. 2, ll. 23-28). Based on this teaching, the Office Action reasons that it would have been obvious to use the pH of Matsui, et al. in the silica making process of Yim.

Even assuming *arguendo* that these references can even be combined, however, the combination still fails to disclose certain aspects of independent claim 24. For instance, the pH referred to by Matsui, et al. is the pH of a "silica acid sol" used in forming a silica hydrogel. If one were to employ this pH in Yim, it would only be in the formation of the silica gel as taught by Matsui, et al. – not in a mixture of the silica gel with a transition metal. In fact, there is no teaching whatsoever to employ a pH of 7 or greater in a *mixture of silica particles and transition metal* in the manner set forth in independent claim 24.

This distinction may be better understood by reference to the present specification. As explained in the present specification, for instance, salts of transition metals are often acidic. Mixing such an acidic transition metal salt with a silica sol can lower the pH and cause the metal salt to precipitate on the surface of the particles. This may compromise the stability of the silica particles and reduce the number of silanol groups present on the surface of the silica particles. Because the transition metal may bind to these silanol groups, the capacity of the particles for the transition metal may be lowered at lower pH values. To ameliorate the pH-lowering effect caused by the

addition of an acidic transition metal salt (e.g., copper chloride), independent claim 24 requires selective control over the pH of the silica particles / transition metal mixture.

Independent claim 32 was also rejected in the Office Action under 35 U.S.C. § 103(a) as being obvious over Yim. As correctly noted by the Examiner, Yim fails to disclose certain limitations of independent claim 32. For example, Yim fails to disclose coupling a transition metal to a surface of silica particles with an organofunctional silane so that modified silica particles are formed. Nevertheless, the Office Action cites U.S. Patent No. 6,111,010 to Yu et al. in combination with Yim in an attempt to render obvious independent claim 32. Yu, et al. is directed to an aqueous solution that contains the reaction product of a polyisocyanate and amino-functional alkoxysilane for use as a binder, adhesive, or sealant. The Office Action asserted that it would have been obvious to “use the aminofunctional alkoxysilane . . . in the silica production of Yim because Yu discloses the alkoxysilane in a process for making compositions comprising colloidal silica.”

Applicants initially note, however, that the silane of Yu, et al. is used as a *binder, adhesive, or sealant* – not in the formation of silica particles. Yu, et al. indicates only that such particles may improve the “potlife” of the aqueous solution. (Col. 8, ll. 8-18). Clearly then, one of ordinary skill in the art would not have been motivated to combine the references in the manner suggested in the Office Action.

Even if combined, however, the references still fail to disclose certain aspects of independent claim 32. The aminofunctional alkoxysilane referred to by Yu, et al. is not “coupled” to a gel or carrier, but is used to improve adhesion and chemical resistance in coatings. (Col. 1, ll. 16-25). If one were to employ this compound in Yim, it would

60. (New) A method as defined in claim 24, further comprising applying said modified silica particles to a substrate.

61. (New) A method as defined in claim 60, wherein said substrate comprises a nonwoven, woven, or paper web.

62. (New) A method as defined in claim 24, wherein the mole ratio of the transition metal to the silica particles is at least about 10:1.

63. (New) A method as defined in claim 24, wherein the mole ratio of the transition metal to the silica particles is at least about 50:1.

64. (New) A method as defined in claim 24, wherein said silica particles are spherical.

65. (New) A method as defined in claim 32, wherein said silica particles have an average size of less than about 500 microns.

66. (New) A method as defined in claim 32, wherein said silica particles have an average size of from about 4 to about 20 nanometers.

67. (New) A method as defined in claim 32, wherein said silica particles have a surface area of from about 50 to about 1000 square meters per gram.

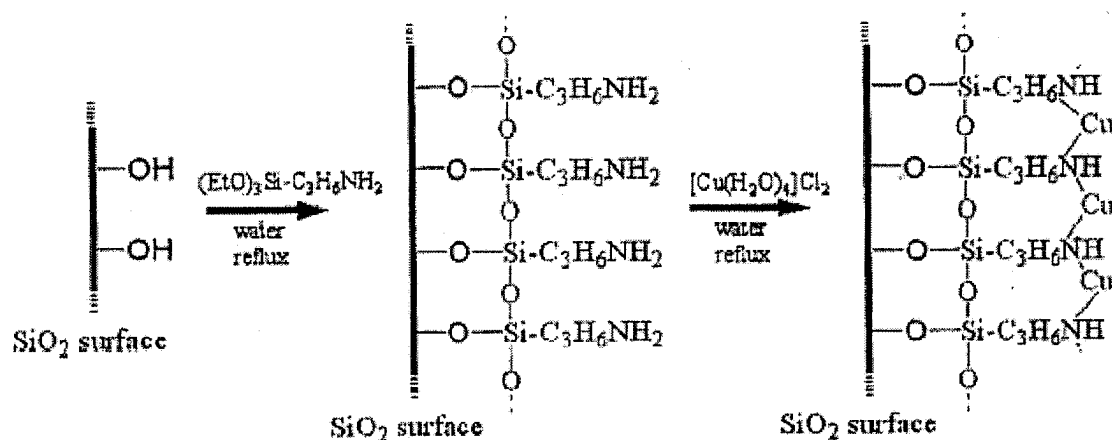
68. (New) A method as defined in claim 32, wherein said silica particles have a pore volume of less than about 0.5 milliliters per gram.

69. (New) A method as defined in claim 32, further comprising applying said modified silica particles to a substrate.

70. (New) A method as defined in claim 69, wherein said substrate comprises a nonwoven, woven, or paper web.

certainly not be as a "coupling agent", much less for coupling a transition metal to a surface of silica particles as claimed. In fact, there is no teaching whatsoever to couple the *silica particles and transition metal* in the manner set forth in independent claim 32.

This distinction may be better understood by reference to the present specification. In one embodiment, for instance, the present specification describes the formation of a coordinate bond between copper and an aminopropyltriethoxysilane coupling agent and a covalent bond between the coupling agent and silanol groups present on the silica particles. An exemplary mechanism for this reaction is set forth below:



The above-illustrated coordinate complex formed between copper and the silane coupling agent may be strong and reduce the likelihood that any free metal will be present during use (e.g., after washing).

Thus, for at least the reasons set forth above, Applicants respectfully submit that independent claims 24 and 32 patentably define over the cited references. Further, at least for the reasons indicated above relating to corresponding independent claims 24

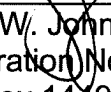
and 32, the corresponding dependent claims also patentably define over the references cited. However, the patentability of the dependent claims certainly does not hinge on the patentability of the independent claims. In particular, it is believed that some or all of these claims may possess features that are independently patentable, regardless of the patentability of the independent claims.

Applicants respectfully submit that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested. Examiner Johnson is invited and encouraged to telephone the undersigned, however, should any issues remain after consideration of this Amendment.

Please charge any additional fees required by this Amendment to Deposit Account No. 04-1403.

Respectfully requested,

DORITY & MANNING, P.A.



Jason W. Johnston
Registration No. 45,675
P.O. Box 1449
Greenville, SC 29602-1449
Phone: (864) 271-1592
Facsimile: (864) 233-7342

Date: 4/16/07